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ABSTRACT

The VETO-project is part of the National Strategy's goals for providing learning opportunities through the use of networks in vocational education in Finland. The National Board of Education, University of Tampere and Hame Polytechnic, Vocational Teacher Education College, and several vocational pilot institutes located at different regions in Finland are involved with the VETO-project. The main goal of the VETO-project is to create the dynamic dialogic model for network-based learning to benefit the needs of vocational education and learning on the job. This paper considers two research questions: (1) What are the elements of the dynamic dialogic model for network-based learning in vocational education? (2) What kind of competence do teachers and students in teachers education have in inquiring as a part of dialogic knowledge construction? The paper describes important results and implications of the project. (Contains 31 references.) (AEF)

Dialogic Knowledge Construction as the Crucial Issue in Network-Based Learning in Vocational Education

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Abstract: The VETO-project is part of the National Strategy's goals in order to provide good learning opportunities through the use of networks in vocational education in Finland. The methodological strategy is action research. This paper presents some essential results of the ongoing project. The main idea in this project have been to construct a dynamic dialogic model for learning and knowledge construction on the net. In this paper, the basic grounds of the model are described and a tentative model is introduced. The results already available of this project show that it is necessary to develop further pedagogy for dialogic knowledge construction on the net in vocational education. Vocational teachers and learners need cognitive tools in order to be competent on the net. The new learning platforms on the Internet are technically fairly good and versatile, but teachers and learners do not know yet, how to use them pedagogically adequate.

Introduction

The VETO-project is part of the National Strategy's goals set out by the Ministry of Education to develop an Information Society Program in Finnish schools. The goals of the national strategy are to provide basic skills to everybody and life long learning opportunities through the use of networks in studying and teaching. Vocational education has an important role in Finland, and the high level of the technological infrastructure in Finland is utilized effectively in vocational education. Learning environments are extended outside the classrooms, and this demands new pedagogical models of teacher action. Learners will engage in and become inspired by learning activities if they think it makes sense (Enqvist 1999).

Many researches show that teachers should be trained both in information-communication technological (ICT) competence and in how to use the network-based environment in a pedagogically skilful way (Hakkarainen, Ilomäki, Lipponen & Lehtinen 1998). The traditional methods of teachers are so deeply ingrained in their minds that it is difficult for them to learn to construct active and workable situations and processes for learning. Network-based learning environments provide a forum for authentic learning and interpersonal interaction with members of the learning community (see e.g. Lave & Wenger 1991; Harasim , Hiltz, Teles & Turoff 1995; Wenger 1998;), peers, and experts. What must a teacher do and how does she or he achieve the competence to allow the worlds of teaching and learning to meet one another? According to many researchers (Harasim et al. 1995; Warschauer, Turbee & Roberts 1996; Anderson & Kanuka 1997), making good use of the possibilities of interaction and learning on the net produces positive learning experiences.

Producing and Sustaining Authentic Learning in Learning Communities

How can we arouse a real desire of learning and joy of working in the students? The process of passion for learning can proceed, according to Enqvist (1999, 275-277), from an interesting, authentic assignment involved with problem solving and inquiring learning. In vocational education, it is really not difficult to find authentic assignments connected and involved with vocational training.

The significance of social interaction and dialogue in learning, emphasized by Vygotsky (1962; 1978), is crucial in this research. The social interaction is essential to construct knowledge and mastery as well as to get comprehensive and in-depth processed learning outcomes in ICT learning environments (Scardamalia, Bereiter & Lamon 1994; Brown & Campione 1996; Salomon & Perkins 1996). Especially when studying and training vocation and profession, it is important to take into consideration a number of implications derived from Vygotsky's pedagogical thinking by Wells (2000, 60-61). These are:1) The classroom is seen as a collaborative community; 2) Purposeful activities involve whole persons; 3) Activities are situated and unique; 4) Curriculum is a means, not an end; 5) Outcomes are both aimed for

and emergent; 6) Activities must allow diversity and originality. Wells (2000) emphasises the importance of the values of inquiry, dialogue, and community.

The notion of a zone of proximal development (ZPD) presented by Vygotsky (1978) is crucial in learning and through that the support of learning can be made adjustable. On the net, this means that it is possible to make learners' thinking transparent so that the teacher can see what kind of tutoring students require in problem-solving situations just at a certain time. The scaffolding metaphor arises from the notion of ZPD (Dillenbourg 1996). A teacher has a big challenge in scaffolding: she or he has to search an optimal model of action, by means of which she or he can promote the learning processes. The opportunity exists, but in order to succeed, in learning collaboration much interpersonal interaction is required (e.g. Bullen 1998; Harasim et al. 1995). Teachers need a model in order to manage learning / teaching situations on the net.

The participators in the learning collaboration can be thought of as cognitive apprentices (Brown, Collins & Duguid 1989), who may increase their knowledge and competence with the assistance of the teacher, peers, and the experts at their disposal. Cognitive apprenticeship supports the learning of professionalism by developing students' "conceptual understanding through social interaction and collaboration in the culture of the domain, not of the school" (Brown et al. 1989, 40). It is especially interesting when the learner can be justified to participate in the activities of some community of experts on the net. Then, one can talk about "legitimate peripheral participation" (Lave & Wenger 1991).

Dialogue in Network-Based Learning

An accepted fact is that in network-based learning, teacher, other experts, and learners form a community where, hopefully, conversation is purposeful, relevant, and fruitful. Dialogue is a type of conversation to achieve these aims (Aarnio 1999). Dialogue as a concept is very complicated and the lay opinion of dialogue is not enough to develop conversation in a network-based environment. According to Bohm (1996, 6), dialogue means "the flow of meaning between or among us". Isaacs (1996; 1999) emphasizes that dialogue does not mean just talking. It is important to distinguish dialogue from the general types of conversations.

Jenlink & Carr (1996) speak of four types of conversations common in educational settings, viz. dialectic, discussion, dialogue, and design. Discussion conversation is the forum in which many of us advocate our own individual position. Dialogue conversation is a conversation where meaning is constructed through sharing. Dialectic conversation focuses on framing a logical argument for distilling the truth. Design conversation focuses on creating something new. Lave and Wenger (1991) believe that an experience can be pedagogically valuable only on one condition: the experience does not consist of individually stored memories, but is primarily comprised of complex interactions and dialogue in the community. A network-based environment is good for this kind of work, where the participants are able to share their knowledge and at the same time contribute to each other's construction of knowledge and competence (Comstock & Fox 1995; Stacey 1999). According to Bohm (1996), it is worth remembering that the word "pa
meanings: "to partake of" and "to partake in". Receiving is as important as contributing.

Responsiveness is very important in the construction of dialogic knowledge and the construction of the meaning happens collaboratively in the act of speaking following one each other (Wells 2000). Bereiter (1994) proposes the word "progressive discourse" in describing the process in which sharing, inquiring, and checking of opinions will shape new understanding.

According to Bohm, Factor & Carret (1991), dialogue is a powerful tool to understand what, actually, is thinking as a process. Factually, all of this knowledge that we have in mind, is transparent in a thought and this knowledge mediates in a thought. We need a tool that will make the process of thinking a little bit slower with the aim of being able to perceive the thinking process at the same time. The skill to find out how somebody is thinking and how she or he explains her or his action (Aarnio 1999, 20-22) could be one method to slow down the process of the thinking. If one has this skill, one can help somebody make her or his thinking process transparent, and at the same time, one is able, as a listener and speaker, to look at one's own process of thinking, namely, what it is like and how it proceeds. In a network-based learning community, one has good chances to develop one's thinking skills through dialogue.

If teachers have the competence to help the learner to open conversation, to inquire and to open so called 'hot words' and utterances, and to express the thinking process on her or his own, which is at that moment incomplete and just getting form, then they will find continuously new paths to promote dialogue. Aarnio (1999) noticed that the student teachers had plenty of difficulties in dialogue, especially in inquiring, in a network-based environment. The facilitators of the dialogue are needed in a network-based environment and participants are assisted at creating dialogue and knowledge construction collaboratively by facilitators. A skilful e-moderator (Berge 1995; Paulsen 1995; Berge &

Collins 2000; Salmon 2000) is able to take the participants into dialogue according to the situation and is also able to continue the dialogue appropriately. Senge (1994) points out that when one can perceive and experience the meanings flowing in a situation and one is able to find out just that thing, which has to put into words, it is an indication of the excellent competence of dialogue. That's why the e-moderator in network based learning should be very sensitive to activate and stimulate the dialogue.

Purpose

The National Board of Education, University of Tampere and Häme Polytechnic, Vocational Teacher Education College and several vocational pilot institutes located at different regions in Finland are involved with the VETO-project. The VETO-project was started 1.5.2000 and will continue until December 2001. The main goal of this VETO-project is to create the dynamic dialogic model for network-based learning to benefit the needs of vocational education and learning on the job. In this article we like to consider two important questions, which are part of our research problems of VETO-project: 1) What are the elements of the dynamic dialogic model for network-based learning in vocational education?; 2) What kind of competence teachers and teacher students have in inquiring as a part of dialogic knowledge construction? We describe some important results and implications we have found out.

Design and Methods

The background of the themes of the VETO-project is based on the results of our earlier researches (Aarnio 1999; Enqvist 1999). We have noticed as teachers in vocational teacher education how difficult it is for teacher students, as well as in-service teachers, to construct learning situations that support problem solving, inquiring, and intensive dialogue in traditional learning and teaching, to say nothing of learning and teaching on the net (Aarnio 1999; Enqvist 1999). The starting point of the VETO-project was the course called "Network-based learning environment as a field of dialogue and learning", and it was organized for 30 vocational teachers from different domain during 5.5.2000 - 9.9.2000. The whole research project was divided into three stages: 1) The orienting and planning stage for the summer and autumn 2000; 2) The applying and constructing stage for the spring 2001; 3) The applying and evaluating stage for the autumn 2001. One of the outcomes of the first stage was a tentative model of network-based learning for vocational education. In the second stage the model has been restructured and improved on grounds of the empirical data that have been collected during research process. The observations in this stage indicate that there is a need to investigate teachers' and teacher students' competence of inquiring as a part of dialogic knowledge construction. Just now the process is in the middle of the stage 2, and that's why the results are tentative.

The strategy of this research project is action research by nature. This research is involved with practical issues, the kind of issues and problems, concerns and needs, that arise as a routine part of activity 'in the real world'. Specifically, practical orientation has remained a defining characteristic of action research. This research has the central features of action research (see Kemmis 1995). It is characteristic of action research that the data is collected by many various mixed methods during the process: e.g. questionnaires, interviews, observation, and documents.

Results

Main result 1

The course "Network-based learning environment as a field of dialogue and learning" was organized for 30 vocational teachers during 5.5.2000 - 9.9.2000. The open question for the course participants (n=30, full time teachers) after the course was: *How has this course improved my understanding concerning of the dialogic knowledge construction?*

The answers of the participants to the open question reflect widely the improved comprehension of this subject area. The participants reflected the importance of the competence of dialogue. Many of them told that they have not been able to think that dialogue is very demanding and learning of dialogue requires a lot of conscious training and great effort. One of the participants answered: *"My understanding of the meaning and the practice of dialogue has been opened so that I am able to evaluate conversations in practical situations in a new way."* His peer caught the point in another way: *"This has shown to me how long the process to change myself as the teacher is with dialogue into e-moderator of the dialogic learning."*

From the participants point of view it was very useful to learn to pick up so called 'hot words' or utterances as a critical skill of dialogue. One participant said that *"it was very insightful to make inquiring questions and to open the 'hot*

words' and the other one emphasized *"the inquiring method with 'hot words' is a very crucial help in conversation on the net..."*

The contribution of dialogue makes the learning process different on the net. One participant formulated this idea: *"Learning and teaching on the net is entirely new to me. I advanced when I noticed the advantages, which follow after the thinking process has been made transparent and public...On the net it is really possible to get authentic thinking together instead of the change thoughts."* The peer participant described the same thing in this way: *"Collaboration is possible on the net, the students are able to work out things together and to create new common understanding."* Dialogue also helps students on the net in general: *"When the dialogue is going, it is easier to find out the difficulties of the student and the results of learning are better."* One participant had very interesting comment: *"I earnestly believe that the net is a possibility and an answer for many situations as a field of dialogic learning ...To my great surprise I think the net as a human and warm friend, which helps me to mediate my thoughts, hopes, experiences etc. to my peers."*

It is professionally very demanding on the teacher to engage students in dialogic knowledge construction on the net and to facilitate students in their learning processes. The participants reflected these aspects critically and here are some examples of their reflections:
"In the learning processes on the net it is important to set realistic aims and to structure the course very clearly..."
"It is necessary to study to use dialogue with the students and to understand the nature of dialogue before a teacher can assume that the process can start and is progressing well on the net....
"The meaning of the dialogue is really crucial on the net. How does the conversation start, how does it go on, how is it directed, and how can you influence the dialogue as a conversationalist and as a tutor."
"The teacher's role in sustaining learning process in the group is essential... By means of dialogue on the net you can catch up with the students very easily or loose them as well - you have to be attentive..."
"The course has facilitated me to get clearer idea how to use dialogue in order to solve problems together."

The students brought up also that learning on the net must not be a digital version of a correspondence course, and the function of the net is not merely to give out material and many kind of tasks or assignments.

Conclusions 1

The answers of the participants indicate that dialogue has become a useful tool to carry out learning on the net. The participants comprehended the nature of a text or other symbolic language; it is a source to joint comprehension and knowledge construction. A text can be like a 'treasury', full of unfamiliar knowledge that leads you to new combinations of issues or to new insights. So called 'hot words' help to open that 'treasury'. The val words' can be seen by means of inquiring the meanings which are hidden back of the words. The participants understood that dialogic knowledge construction brings along something that nobody knows before.

The participants were satisfied with the things they learned on the course. Their realized that the mastery of dialogue, the construction of meaningful learning process and structuring the process on the net as explicit as possible, are skills, which cannot be compensated with any other skills. The professional skill of a teacher as a facilitator of dialogue and as a "scaffolder" on the net, demands efforts in order to evolve. The traditional working model of teachers and the monological style of conversational culture, cannot be relied. An attitude of inquiring and explorative talk that will promote learning, was difficult to them.

To sum up, it was demanding for participants to act purposefully in WebCT-learning platform; they have to struggle hard to catch the collaborative idea of dialogue; and they need a lot of help and tutoring in order to become good facilitators of dialogue, "scaffolders", and constructors of meaningful and enthusiastic dialogic and inquiring learning processes.

Main result 2

Because, as we have seen above, the inquiring dialogue is a difficult way to work for teachers, it was important to find out what kind of inquiring questions the vocational teacher students (n=298) could bring up fairly spontaneously on the net in order to help a case example, student (A), to continue her online learning. All these teacher students were studying in Häme Polytechnic, Vocational Teacher Education College and the mail lists and WebCT learning platforms were set up for them. Before sending the proper open question, one preliminary information message was sent to them via e-mail, four days before the proper message. So the students knew to wait some important task message and they knew that when they opened the proper message, they would have only 15 minutes time to perform the task and then

send their answers back to the researchers. So the situation was spontaneous enough. 80 reply-message answers were received via e-mail on time.

The teacher students were asked to imagine themselves as an online teacher of the student (A). In the task, there was given an example message written by the student (A): *"The very first day in the world of Internet and e-mail. I feel myself chaotic. It seems that it is difficult for me to face things I don't understand at all. I am distressed, I feel like crying and I feel depressed.... My student fellows have sent an e-mail message to me, but I cannot find it in my computer. I don't know, where I find it. Otherwise, even the simplest operations in the Word- text processing program seem not to be coming to my mind at the moment. Just now, I would like to leave off that job. This feeling of mine has come out also in other awkward and difficult situations. I have to work with this feeling by myself. How is that?"*

Now the teacher students were asked to make 5-8 questions to the student (A), so that the teacher students would find out the train of thought of the student (A) and in order to help the student (A) to make progress. It is very important to notice that the teacher students were asked to make only questions, interrogative sentences, not any piece of advice or something like that. The findings were interesting.

In the answers of the respondents (n=80), there were given 565 reactions and only 135 of them (= 23%) were pure, open questions, without any preassumptions or proposals for the arrangement of the matter. All the other reactions (77 %) were either narration of teacher students' own range of thought and world of experience, emotional support or closed questions. The closed questions lead us into 'either-or' –type of answer giving, or they contain either a proposal of the questioner in order to work out the situation or an interpretation of the student's condition or an interpretation of his/her way of doing things. Then, because the questions are not open, the student's train of thought and starting points will not be found out but they will be stayed unknown. The answers contained a lot of instructions, own ideas or experiences in related situation and interpretations, in other words illusions about the condition of the student (A), although they were asked only to make questions to the student (A), who needed help. Only 2 respondents of 80 understood the idea that scaffolding will succeed when a teacher has patience to start from student's train of thoughts.

Conclusions 2

The teacher students use either closed questions or questions which emerged from the expectations and assumptions of their own. They have also tendency to guide and tutor the student, who needs help, based on the teacher student's own thoughts, experiences and illusions. However, the open problem solving requires the skill of collaborative thinking and thus it should be able to keep the situation appropriately open for the new collaborative thinking. The open and pure questions that familiarize with the train of thoughts of the other, would take in that collaborative direction.

Dynamic Dialogic Model for Learning and Knowledge Construction on the Net

Finally we will present our dynamic dialogic model for learning and knowledge construction on the net in vocational education. Our model is some kind of synthesis of long lasting action research processes since 1996, when we started our earlier action researches (e.g. Aarnio 1999; Enqvist 1999), and ending to the ongoing VETO-project. The model is formed as a result of 1) these earlier action researches; 2) interviews and discussions with teacher trainers in Häme Polytechnic, vocational teachers and students in the pilot institutes; 3) the course "Network-based learning environment as a field of dialogue and learning" for vocational teachers (main result 1); 4) e-mail open question for teacher students (main result 2); and 5) the theory of dialogue and dialogic knowledge construction. VETO-project will continue to the end of the year 2001, and the implementing and testing of the tentative model has been started up and will continue in vocational education.

This model includes the essential elements of the learning and dialogic knowledge construction on the net. The model is dynamic and the progress is cyclic. It helps teachers and learners to identify the critical points or stages in the learning process on the net. (In this paper, there is no room for more details and explanations.)

Teacher activities on the net: 1. Starting up learning process; 2. Assisting in finding and focusing learning problems; 3. Coaching learners; 4. Structuring learning process; 5. Assisting in searching for and finding information on the Internet; 6. Scaffolding learner groups in the learning platforms; 7. Inquiring about learners' train of thought and semantic contents of learners'; 8. Nurturing and caring for community of learners; 9. Participating the process of evaluation.

Learner activities on the net: 1. Becoming acquainted with the world of Internet and the learning platform; 2. Searching for and designing vocational inquiring (study) problems; 3. Exploiting sources of information; 4. Problem

solving and knowledge construction; 5. Specifying objectives of vocational skill and knowledge; 6. Knowledge construction according to dialogic inquiring learning; 7. Use of inquiring way of action; 8. Wondering and finding new tracks to continue dialogue; 9. Nurturing and caring for community of learners; 10. Developing vocational practices; 11. Evaluating improvement of vocational practices.

The results already available in this project show that it is necessary to develop further network-based learning and pedagogy in vocational education. The new learning platforms on the Internet are technologically fairly good and versatile learning environments, but teachers do not yet know how to use them in a pedagogically adequate manner. Our aim is that this dynamic dialogic model promotes learning and knowledge construction on the net.

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